Against the Grain

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Optimizing Library Services — Institutional Repositories and Knowledge Curation: Revisiting Knowledge Conversion in the Academic Environment

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Column Editors' Note: *This column features* ***IGI Global*** *author,* ***Arjun Sabharwal****, Associate Professor/Digital Initiatives Librarian for the* ***University of Toledo****, USA, and a contributor to the publications* ***Managing Knowledge and Scholarly Assets in Academic Libraries****, edited by* ***Bhojaraju Gunjal*** *from* ***National Institute of Technology Rourkela****, India, and* ***Digital Curation: Breakthroughs in Research and Practice****, edited by* ***Information Resources Management Association****, USA. — **CC & LW***

The ubiquity and importance of institutional repositories (IRs) in higher education have significantly increased over the past two decades, as IRs have become recognized tools for curating organizational records, digitized heritage collections, research data, and scholarly publications — in other words, organizational knowledge.

Knowledge curation combines commitments to long-term preservation with teaching and making institutional records more accessible for scholarly and public inquiries in order to inspire sustained discourse. In contrast, knowledge conversion represents the latent but truly epistemological dimension of knowledge curation with a focus on knowledge acquisition.

Knowledge acquisition is an outcome of research, observation, experiments, analysis, collaboration, and presentation, and it evolves in personal (tacit) and shared (explicit) forms, resulting from learning and communication. Knowledge conversion is, in fact, a human curation practice through acquiring, interpreting, and communicating knowledge within an organization, surrounding communities, and communication networks beyond. Institutional repositories play a clearly defined role in this context, as curation involves critical selection, knowledge organization, and communication.

However, not all knowledge-focused fields utilize an IR. For example, knowledge as it is understood in philosophy, psychology, ethnography, social sciences, and humanities evolves independently of such tools until scholars incorporate them into their practices.

As such, this article focuses on using the IR as a knowledge curation platform and, more specifically, as a knowledge conversion tool in the higher education environment to handle a broad range of data, information, and knowledge. The article first presents a conceptual framework of key concepts, and then it addresses the role of IRs in the four modes of knowledge conversion.

Conceptual Framework

Knowledge curation, knowledge conversion, knowledge architecture, and institutional repositories are related concepts. At the heart of *knowledge curation* are *knowledge* and *curation*. The *Oxford Dictionary* defines *knowledge* as "Facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject" (**Oxford University Press**, 2019). *Curation* means "guardianship" (Compact Edition of the *Oxford English Dictionary*, 1971 "curation") focused on selection, organization, presentation, and care of artifacts (in museums) and manuscripts (in archives) in collections and exhibitions. *Knowledge curation* means "The selection of a subset of information based on particular criteria that is distributed to users" **(IGI Global,** 2019, "What is knowledge Curation"). **Murray** and **Wheaton** (2015) have defined knowledge curation as "the care and feeding of an organization's critical knowledge" (para. 2) with two dimensions: an explicit dimension dealing with technology used to record information; and a tacit dimension focused on knowing recorded information. To this end, *knowledge conversion* (**Nonaka** and **Takeuchi**, 1995) refers to the interaction between *tacit* (personal and intangible) and *explicit* (tangible and transmittable) states of knowledge.

A university's *knowledge architecture* (**Applehans**, **Globe**, and **Laugero**, 1999; **Rebentisch** and **Feretti**, 1995) is its framework for incorporating content (data, information and knowledge), people (researchers, faculty, students, administrators, technologists, information specialists, and others who create share, and curate content), and technologies (databases and digital repositories) used to curate knowledge.

As a part of such an architecture, the IR "is a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members" (**Lynch**, 2003, "Defining Institutional Repositories" section, para. 1). An IR is also a "knowledge curation platform…to enable researchers and experts in a particular field to define, detail and explore the knowledge within that field via a quality-driven collaborative curation process" (**Gorza**, **Tudorache** and **Dumontier**, 2013, p. 1).

IRs are vital elements in the tool chain for *knowledge management* "in the process of capturing, distributing, and effectively using knowledge" (**Davenport**, 1994; **Davenport** and **Prusak**, 1998). In his elaborate definition for *knowledge management*, **Duhon** (1998) includes identification, capture, evaluation, retrieval, and sharing of organizational assets (including documents, policies, and procedures) in databases with previously uncaptured employee expertise and experience. **Young** (2009) defines knowledge management as "the discipline of enabling individuals, teams and entire organisations to collectively and systematically create, share, and apply knowledge" (para. 2). **Deshpande et al**. (2017) define *academic knowledge management* as "a set of processes that provides academic(s) the most effective way to create and organize knowledge, share this knowledge, and foster its application…which supports the achievement of the goals related to their missions" (p. 8).

IRs are not just information retrieval mechanisms but curation platforms ensuring long-term access to organizational assets, they are important components in the systematic management and curation of organizational knowledge. "By virtue of their association with archives and digital curation, IRs play a transformative role in academic knowledge management," which is vital to knowledge activities including the acquisition, creation, conversion, sharing, dissemination, transfer, preservation, and reuse of knowledge in higher education (**Sabharwal**, 2017; see also **Sabharwal**, 2010).

The *Knowledge* in Knowledge Curation and Conversion

Universities and scholarship evolve and revolve around humanistic knowledge and scientific research, which require rich source data, information, and knowledge obtained through observation, fieldwork, interviews, research, analysis, interpretation, and scientifically sound methodology, which serve as a foundation for continued scholarship. Knowledge creation is a cyclical process. In fields like ethnography, sociology, philosophy, folklore, and history (particularly, oral history), humans are the sole sources of rich local (and tacit) knowledge and other data and information that requires further analysis and interpretation.

continued on page 79

Once published, however, explicit knowledge does not necessarily circle back to the sources who may not be available for future input in some fields. Researchers are able to customarily share their data, information, and knowledge through formal publication, informal correspondence or discussions, classroom teaching and other channels of verbal communication (such as workshops and conferences), or curation using a subject or an IR.

How *knowledge* becomes an object of curation may be evident in how it relates to the concepts of data and information. **Zeleny** (1987) and **Ackoff** (1989) have presented frameworks for clarifying data, information, knowledge, and wisdom. Building on **Zeleny's** work, **Ackoff** (1989) has developed a framework for systematic thinking that distinguishes data, information, and knowledge and is illustrative for present purposes:

> Data are symbols that represent properties of objects, events and their environments…they are products of *observation*…Information is inferred from data…[It] is contained in *descriptions*, answers to questions that begin with such words as *who*, *what*, *when*, *where*, and *how many*…Knowledge is know-how…[which] makes possible the transformation of information into *instructions*. (p. 3-4)

Ackoff also asserts that data, information, and knowledge may be available as sources of new data, information, and knowledge, thus underscoring the cyclical nature of knowledge creation. The systematic differentiation of *knowledge* from data and information facilitates the treatment of *knowledge* (in explicit form) as a self-defined object of curation (in the form of written documents, worksheets, databases, shape files, and non-textual media) while much personal knowledge (in tacit form) remains intangible or socialized via verbal discussions. Effective curation of knowledge then ensures fruitful conversion of knowledge discussed next.

Knowledge Conversion and the Institutional Repository

While it is possible for IRs to contain and represent tacit knowledge in limited form, such as lecture or field notes, they are designed to contain explicit (shared, printed, communicated) knowledge and can facilitate knowledge conversion between tacit and explicit forms. Several commonly known platforms have been in use for decades, such as *DSpace, Digital Commons, Fedora Commons, Islandora, Hydra, Omeka,* and *CONTENTdm*. Owing to their unique architectures and capabilities, some are more suitable for curating scholarly research (e.g., *Digital Commons*) while others are ideal for curating digitized heritage collection (e.g. *Omeka*) in a digital humanities context.

Nonaka and *Takeuchi* (1995) have analyzed the four modes of knowledge conversion, but it is necessary to interject the role of the institutional repository in order that each of these modes fits into the framework of knowledge curation via such repository. Socialization, in most cases, retains tacit knowledge in that form. It is a "process of sharing experience and thereby creating tacit knowledge such as shared mental models and technical skills" (**Nonaka** and **Takeuchi**, 1995, p. 62). A digital curator can hold workshops to train others to use the IR platform and share anecdotes, personal experiences, and even some horror stories related to content migration, metadata transformation, and reference transactions. Using the IR is essential in order to get points across to the audience favoring visual content also, but the purpose of the platform in this case is not to convert knowledge. In some cases, training materials may appear in published in technical publications, books, webinars, and posters, but these forms no longer fall under socialization.

Presentations and social media conversations involve a high degree of socialization, but the inclusion of some media (slide presentations, podcasts, *YouTube* videos, images, visualizations, etc.) indicates the use of externalization, which converts tacit knowledge into explicit knowledge. "It is an essential knowledge creation process in that tacit knowledge becomes explicit, taking the shapes of metaphors, analogies, concepts, hypotheses, or models" (**Nonaka** and **Takeuchi**, 1995, p. 64). Researchers present new knowledge resulting from research, surveys, interviews, and experimentations at conferences and publish in various forms, and universities have begun to encourage faculty to upload their post-prints (within legal limits set by publishers and copyright terms) into their IRs. However, such cases may truly be considered post-conversion activities unless authors voluntarily use the IR as a self-publishing avenue. Open access (especially Green OA) publishing is likely to enable IRs to become a part of the externalization process, which can convert authors' tacit knowledge into explicit form. Archives are also increasing their efforts to make some institutional records available to the public, which is another demonstration in knowledge curation because data and information have been shared in reports, supporting decision making and other actionable knowledge by organizational leaders (chairs, deans, directors, and senior administrators).

Combination retains knowledge in explicit form. It is a "process of systemizing concepts into a knowledge system. This mode of conversion involves combining different bodies of explicit knowledge. Individuals exchange and combine knowledge through such media as documents, meetings, telephone conversations, or computerized communication networks" (**Nonaka** and **Takeuchi**, 1995, p. 67). The IR serves as an ideal tool in knowledge curation since all contents in the combination process may be accessible. Data, information, and knowledge presented in digital form are accessible to anyone at the organization preparing reports and other studies.

Finally, internalization represents the reversal of the conversion process. It is the "process of embodying explicit knowledge into tacit knowledge and is closely related to 'learning by doing.' When experiences through socialization, externalization, and combination are internalized into individuals' tacit knowledge bases in the form of shared mental models or technical know-how, they become valuable assets" (**Nonaka** and **Takeuchi**, 1995, p. 70). This method allows trainees to study data and information published in the IR in order to develop new (tacit) knowledge, which authors can eventually pass on to others through the methods described above.

Conclusion

Institutional repositories are vital to knowledge curation in the digital environment, and the discussion of knowledge conversion has presented a systematic view of the roles IRs have in creating and sharing knowledge through digital technology. Knowledge conversion is a knowledge curation process allowing researchers, teaching faculty, administrators, staff, donors (of special collections and archival records), interviewees (in oral histories), cultural informants (in ethnography and folklore) to share data, information, and knowledge with a wider audience in a variety of ways known to academics and practitioners in the business community and various industries. There is, however, a vast epistemological ground in the social sciences (e.g., anthropology, ethnography) and the humanities (e.g., philosophy, history) where knowledge creation does not rely on curation technologies (such as IRs). In fact, authors may decide to curate their own works in their institutional repositories well after publishing in a formal venue such as a journal, conference proceeding, or book chapter. The use of the IR represents interests related to historical reflection and preservation, which is where finalized reports and data are available for viewing and further study. Knowledge curation through the IR further supports collaboration across organizational units that have relied for very long on data silos and departmental databases.

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continued on page 80

Optimizing Library Services
from page 79

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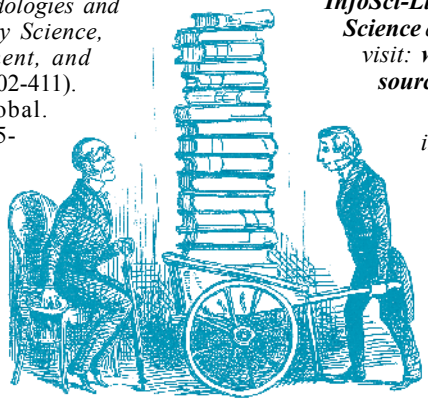
Column Editor's End Note: *As the curation and dissemination of knowledge is critical to the education of all researchers and professionals working within information and knowledge management fields,* ***IGI Global*** *continues to publish innovative, peer-reviewed research within Library & Information Science. With a collection of over 600+ titles in timely topics including collection development, acquisitions, archiving, technology, administration and leadership, and more, all of these titles are featured in* ***IGI Global's InfoSci-Library and Information Science*** *database. To learn more, visit:* ***www.igi-global.com/eresources.***



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Considering Games ...
from page 73

tography skills and deep thinking and colorful lights. By all accounts all of the participants had a blast, had fun and did learn a great deal about the science and necessities and danger and adventure in planning and executing a mission to Mars. The trick seemed to be that it was not necessarily fun to learn about those Mars and space things. But, in the process of having fun in the experience (by surviving a crash landing on Mars), the participants learned things — not the least of which was cooperation and problem solving under pressure. Indeed, hearts and minds were grabbed.

So, this games in education thing can actually work. I look forward to applying it directly to teaching library skills. Seeing my students having fun in a library instruction class is a particular secret fantasy of mine. I can hardly wait. Learning may not always be fun. But, one can more easily learn something while having fun. So, up with the online catalog and bring on the smoke machine!